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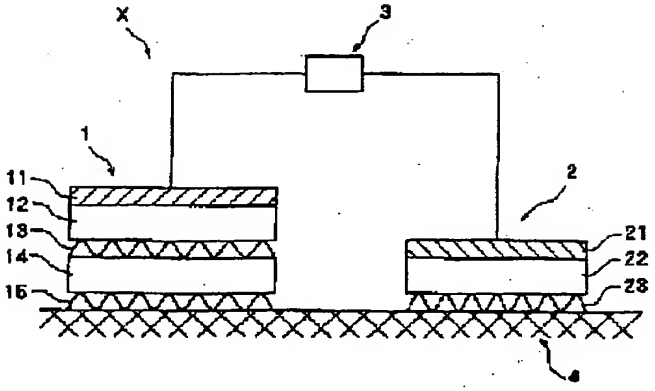
TITLE : IONTOPHORESIS APPARATUS



ABSTRACT : PROBLEM TO BE SOLVED: To provide an iontophoresis apparatus which administers an ionic medicine.

SOLUTION: An iontophoresis electrode section 1 comprises an electrode material 11 which is connected to a power source of the same kind of the polarity as the polarity of the electrification ions of the ionic medicine, a conductive medium 12 which is disposed at the electrode material, an ion exchange membrane 13 which is disposed at the conductive medium and selects the ions opposite to the electrification ion of the ionic medicine, the ionic medicine 14 which is disposed on the ion exchange membrane for selecting the ions opposite to the electrification ion of the ionic medicine and an ion exchange membrane 15 which is disposed at the ionic medicine and selects the ions of the same kind as the electrification ions of the ionic medicine. A ground electrode section 2 comprises an electrode material 21 which has the polarity opposite to the polarity of the electrode material of the iontophoresis electrode section and a conductive medium 22 disposed at the electrode material and an ion exchange membrane 23 which is disposed at the conductive medium and selects the ions opposite to the electrification ions of the ionic medicine.

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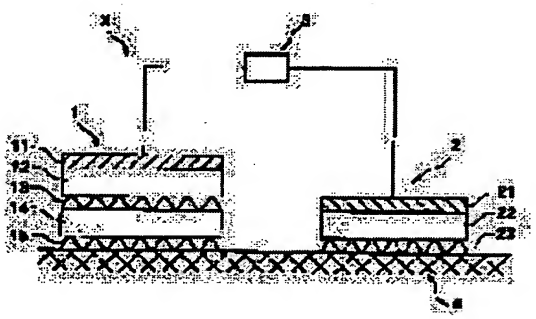
(54) IONTOPHORESIS APPARATUS

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an iontophoresis apparatus which administers an ionic medicine.
SOLUTION: An iontophoresis electrode section 1 comprises an electrode material 11 which is connected to a power source of the same kind of the polarity as the polarity of the electrification ions of the ionic medicine, a conductive medium 12 which is disposed at the electrode material, an ion exchange membrane 13 which is disposed at the conductive medium and selects the ions opposite to the electrification ion of the ionic medicine, the ionic medicine 14 which is disposed on the ion exchange membrane for selecting the ions opposite to the electrification ion of the ionic medicine and an ion exchange membrane 15 which is disposed at the ionic medicine and selects the ions of the same kind as the electrification ions of the ionic medicine. A ground electrode section 2 comprises an electrode material 21 which has the polarity opposite to the polarity of the electrode material of the iontophoresis electrode section and a conductive medium 22 disposed at the electrode material and an ion exchange membrane 23 which is disposed at the conductive medium and selects the ions opposite to the electrification ions of the ionic medicine.



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* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] In the iontophoresis equipment which has the iontophoresis polar zone (operation lateral electrode section) linked to the power source used in order to prescribe ionicity drugs for the patient by iontophoresis, and the grand polar zone (non-acting lateral electrode section) (1) Electrode material by which the . aforementioned iontophoresis polar zone was connected to the electrification ion of (1)-1. ionicity drugs, and a polar power source of the same kind, (1) The conductive medium of the -2. aforementioned electrode material arranged in the front face at least, (1) Ion exchange membrane which chooses ion opposite to the electrification ion of the ionicity drugs arranged in the front face of the -3. aforementioned conductivity medium, (1) Ionicity drugs arranged in the front face of the ion exchange membrane which chooses ion opposite to the electrification ion of the -4. aforementioned ionicity drugs, And the thing which consists of ion exchange membrane which chooses the electrification ion of the ionicity drugs arranged in the front face of the (1)-5. aforementioned ionicity drugs, and ion of the same kind, And polar electrode material with (2). aforementioned grand polar zone opposite to the electrode material of the (2)-1. aforementioned iontophoresis polar zone, (2) It consists of ion exchange membrane which chooses ion opposite to the electrification ion of the ionicity drugs arranged in the front face of the conductive medium of the -2. aforementioned electrode material arranged in the front face at least, and the (2)-3. aforementioned conductivity medium, Furthermore, iontophoresis equipment characterized by constituting the iontophoresis polar zone at least in (3). aforementioned iontophoresis polar zone and the grand polar zone so that it may be equipped free [attachment and detachment of other components] to an electrode material element.
[Claim 2] the grand polar zone -- the above -- "-- (2)-2. -- conductive medium" arranged in the front face of said electrode material -- "-- (2)-3. -- the iontophoresis equipment according to claim 1 which is what has the ion exchange membrane which chooses ion opposite to said ion exchange membrane between ion-exchange-membrane" which chooses ion opposite to the electrification ion of the ionicity drugs arranged in the front face of said conductive medium.
[Claim 3] Iontophoresis equipment according to claim 1 or 2 constituted so that it may be equipped with the iontophoresis polar zone and the grand polar zone free [attachment and detachment of other components] to each electrode material element.
[Claim 4] the grand polar zone -- "-- (2)-3. -- ion-exchange-membrane" which chooses ion opposite to the electrification ion of the ionicity drugs arranged in the front face of said conductive medium -- the iontophoresis polar zone -- "-- (1)-5. -- ion-exchange-membrane" which chooses the electrification ion of the ionicity drugs arranged in the front face of said ionicity drugs, and ion of the same kind, and abbreviation -- the iontophoresis equipment according to claim 1 or 2 arranged on the level which becomes flat-tapped.
[Claim 5] Iontophoresis equipment according to claim 1 or 2 with which the grand polar zone is constituted in un-one body to the iontophoresis polar zone.
[Claim 6] Iontophoresis equipment according to claim 1 or 2 constituted in [the grand polar zone adjoins the iontophoresis polar zone, and] one.
[Claim 7] Iontophoresis equipment according to claim 1 or 2 with which the conductive medium

of the iontophoresis polar zone and the grand polar zone is constituted including the matter which oxidizes or is easy to be returned.
[Claim 8] Iontophoresis equipment according to claim 7 which consists of solutions with which a conductive medium contains a ferrous sulfate and ferric sulfate as matter which oxidizes or is easy to be returned.
[Claim 9] Iontophoresis equipment according to claim 7 which consists of solutions with which a conductive medium contains an organic acid and/or its salt as matter which oxidizes or is easy to be returned.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the equipment (henceforth iontophoresis equipment) used when prescribing various kinds of ionicity drugs for the patient endermically by iontophoresis (iontophoresis) (endermic drug delivery). Furthermore, since the energization condition (constant current and/or constant voltage) stabilized by this invention at the long period of time in the iontophoresis polar zone (operation lateral electrode section) and the grand polar zone (non-acting lateral electrode section) is secured in detail, The drugs component charged in forward (+) of ionicity drugs or negative (-) in the iontophoresis polar zone can be made to convey to a skin (or membrane) side efficiently (drive). Moreover, while contributing to maintenance of the stable energization condition which the iontophoresis polar zone (operation lateral electrode section) and the grand polar zone (non-acting lateral electrode section) described above, the bad influence to the skin by electrode reaction can be eliminated. It is related with the iontophoresis equipment which has the outstanding property to say. Furthermore, the iontophoresis equipment of this invention arranges in the iontophoresis polar zone and the grand polar zone two or more ion exchange membrane from which ion selectivity differs, and although the arrangement mode of the ion exchange membrane concerned is used in relation with the electrification ion of ionicity drugs, changing, since this invention has saved labor the arrangement activity and exchange of said ion exchange membrane, it relates to iontophoresis equipment with high operability and convenience again.
[0002]
[Description of the Prior Art] As opposed to the ionicity drugs (ionicity chemical) arranged on the skin of a request part, or membrane (only henceforth the skin) The approach of giving the electromotive force which makes said ionicity drugs driving to the skin, and making these ionicity drugs introducing into the inside of the body through the skin (osmosis) It is called iontophoresis (iontophoresis, ion TOFO rhe cis- ** iontophoresis, iontophoresis) (about the definition of said iontophoresis, JP,63-35266,A is consulted, for example).
[0003] said -- it carried out -- as -- iontophoresis (iontophoresis) the ion arranged on the skin -- the ionicity drugs of voltinism are made to drive under predetermined electromotive force (transportation), and it is made to permeate into the skin For example, the ion with positive charge is driven in the skin to the anode (anode plate) side of the electric system of iontophoresis equipment (transportation). On the other hand, the ion with a negative charge is driven in the skin to the cathode (cathode) side of the electric system of iontophoresis equipment (transportation).
[0004] As ionicity drugs applied to the above mentioned iontophoresis, there is the following, for example.
(1) . -- just charged ionicity drugs: -- narcotics (procaine hydrochloride, lidocaine hydrochloride, etc.), gastrointestinal disease therapy agents (carnitine chloride etc.), skeletal muscle relaxants (bromination van clo NIUMU etc.), and an antibiotic (tetracyclines pharmaceutical preparation, kanamycin system pharmaceutical preparation, gentamycin system pharmaceutical preparation).
(2) -- ionicity drugs: charged in a . negative -- a vitamin (it is hereafter written as V) agent,

adenocoriticotropic hormone (VB2, VB12, VC and VE, folic acid, etc.) (hydrocortisone system water solubility pharmaceutical preparation, dexamethasone system water solubility pharmaceutical preparation, prednisolone system water solubility pharmaceutical preparation, etc.), and an antibiotic (penicillins water solubility pharmaceutical preparation, chromium FENI call system water solubility pharmaceutical preparation).

[0005] Research and development in the equipment which applies ionicity drugs to the approach and it which are prescribed for the patient by iontophoresis is done for many years, and the thing of various many ways is proposed. There is a thing using ion exchange membrane as a conventional technique about this kind of iontophoresis. In addition, although mentioned later in detail, this invention also belongs to the category using ion exchange membrane. For this reason, in order to ** to an understanding of the difference using ion exchange membrane between this invention and the conventional technique, the conventional technique using ion exchange membrane is explained in detail hereafter.

[0006] 1. Patent application official announcement Taira No. 504343 [three to] official report (henceforth conventional technique 1)

(1) . -- this conventional technique 1 is indicating what consists of the ion exchange membrane which chooses the ion which is arranged in the outside (side which touches the skin) of (i) electrode plate, the reservoir machine which holds the ionicity (or it is ionizable) drugs which are going to carry out (ii) osmosis, and said (iii) reservoir machine as an iontophoresis electrode, and has the same polar charge as said ionicity drugs.

(2) -- . -- it be explain that this conventional technique 1 press down a motion of an ion kind with a possibility may make restrain migration of the opposite electrification ion which be going to shift the function of ion exchange membrane to an electrode side exceeding the interface between an electrode and the skin by ion exchange membrane in case said ionicity drugs make convey to a skin side (drive), for example, sodium and chlorine, and an ion current path which exist in the other skins and be different from ionicity drugs.

(3) Since . and this conventional technique 1 can lessen other migratory electrification support into the reservoir machine which holds ionicity drugs by said ion exchange membrane, it is being explained that the administration effectiveness of ionicity drugs can be increased.

[0007] 2. U.S. Pat. No. 4,722,726 specification (henceforth conventional technique 2)

(1) . -- the room although this conventional technique 2 is explained as a related technique in the official report of said conventional technique 1, after it fills (i). buffer liquid (buffer solution) as an iontophoresis electrode, and the bottom room which filled ionicity drugs -- classifying -- and (ii). -- the electrode of the structure which isolated said top room with the bottom room by ion exchange membrane is indicated.

(2) . -- the room after this conventional technique 2 fills buffer liquid (buffer solution) softens the bad influence of hydrolysis of water, and ion exchange membrane explains that ionicity drugs isolate from the contents of a top room. However, the technique of using the buffer liquid indicated by this conventional technique 2 has the side face which is not desirable in which the transportation efficiency of the electrification ion of the effective drugs component of ionicity drugs is reduced clearly in order to raise the concentration of an additional ion kind into a system. Therefore, the technique of using buffer liquid simply should be cared about.

[0008] 3. JP,3-94771,A (henceforth conventional technique 3)

(1) . -- the moisture attaching part which this conventional technique 3 is surrounded by (i) flexibility supporter material, and has an electrode plate inside, and (ii) -- the electrode for iontophoreses which consists of ion exchange membrane arranged in the front face (skin side) of said moisture attaching part and (iii) a drug layer (ionicity drug layer) arranged in the front face (skin side) of said ion exchange membrane is indicated.

(2) . -- this conventional technique 3 tends to prescribe drugs for the patient by high concentration at the time of administration of an ionicity drug, preventing dilution by moisture.

(3) ., for this reason this conventional technique 3 constitute the electrode for iontophoreses on that living body (skin) contact side using the thing to which the drug was made to stick or adhere by spray dry, spraying, etc. while they do not penetrate a drug substantially and the ion exchange membrane of water permeability is used for them.

[0009] 4. JP,4-297277,A (henceforth conventional technique 4)
This conventional technique 4 is a thing about application of the point concerning an applicant for this patent. (1) . -- For example, it sets to the drawing 2 and is the iontophoresis polar zone (operation lateral electrode section) (in the case of drawing 2 , in relation with the polarity of the ion of the ionicity drugs to be used, cathode serves as the operation lateral electrode section.). the gauze / anion exchange film containing the gauze / cation exchange membrane / ionicity drugs containing a negative plate / ionicity drugs -- since -- what was constituted from becoming multilayer structure is indicated.
(2) . -- the iontophoresis technique of an indication on this conventional technique 4 is set as the object of amelioration of this invention, and is explained in detail about the limitation of this conventional technique 4 at the time of explanation of this invention mentioned later.
[0010] In the above mentioned conventional technique, if the conventional technique 4 observes the use (arrangement) number of sheets of ion exchange membrane, to said conventional techniques 1-3 being the things of the monolayer structure which uses one ion exchange membrane, it is the point of indicating the thing of the double layer structure which uses two ion exchange membrane, and is different from other things. When this invention observes the use number of sheets of ion exchange membrane, it belongs to double layer structure like said conventional technique 4. However, although this invention is mentioned later in detail, in the conventional technique 4, it is based on completely different technical thought, and the operation lateral electrode section has the big focus in the point which adopts the double layer structure of three sheets or four sheets which arranged ion exchange membrane also in the grand lateral electrode section (earth side polar zone, neutral polar zone) from the first.
[0011]
[Problem(s) to be Solved by the Invention] As described above, the technique of using ion exchange membrane exists in the approach of prescribing ionicity drugs for the patient endermically by iontophoresis. However, the iontophoresis technique using the above mentioned conventional ion exchange membrane is lacked in the suggestion for preventing and eliminating the various faults based on the electrochemical reaction in the electrode plate front face in the iontophoresis polar zone (operation lateral electrode section) and/or the grand polar zone (non-acting lateral electrode section), or the original idea. If another word is carried out, the iontophoresis technique using the conventional ion exchange membrane cancels the fault induced from there paying attention to the total overall electrochemical reaction in the iontophoresis polar zone (working-electrode section) and the grand polar zone (non-acting lateral electrode section), and lacks in the attitude which is going to establish the iontophoresis technique of high added value.
[0012] For this reason, although ion exchange membrane is used in the operation lateral electrode section so that the iontophoresis technique of using the conventional ion exchange membrane, and the conventional technique more specifically described above may see, the conventional iontophoresis technique of the type which is not used in the grand polar zone has the following faults.
[0013] (i) It is difficult to prescribe ionicity drugs for the patient under the energization condition stabilized for a long period of time [.] (drug delivery) (it is difficult to carry out operation under the conditions of the constant voltage stabilized for a long period of time or constant current). For example, in the operation lateral electrode section of the forward (+) pole, although the polarity of the operation lateral electrode section change with polarities of the electrification ion of the active principle of ionicity drugs, since the physiological saline which be a conductive medium electrolyze by the electrode plate interface and generate air bubbles (oxygen gas, chlorine gas, etc.), energization resistance become large by this and the iontophoresis effectiveness (transportation efficiency of ion) be down quickly with time. Having described above arises also with the air bubbles (hydrogen gas etc.) generated in the grand polar zone of the negative(-) pole.
[0014] (ii) . In the contact side of the operation lateral electrode section and/or the grand polar zone, and the skin, a burn, inflammation (pH valence burn by rapid pH change of H+ generated by the current nature burn induced by the current itself and electrolysis or OH- etc. is included.),

etc. arise.
[0015] (iii) In the contact side of the electrode plate (for example, + pole) of . grand polar zone, and the skin, the damage of the skin by the harmful matter generated by electrolysis of the physiological saline which is sweat and the conductive medium on the front face of the skin, for example, the hypochlorous acid based on Cl- (chlorine ion), (this is known as a powerful oxidizing agent) etc. arises.
[0016] (iv) In the contact side of the electrode plate (for example, one pole) of . grand polar zone, and the skin, the damage of the skin by the harmful matter generated by electrolysis of the physiological saline which is sweat and the conductive medium on the front face of the skin, for example, high alkalinization, (NaOH) etc. arises.
[0017] This invention is originated in view of the fault of the conventional iontophoresis technique in which the above mentioned ion exchange membrane was used, and a limitation. this invention person examined wholeheartedly the conventional iontophoresis technique in which ion exchange membrane was used so that he may attain a tendency to heighten the added value.
[0018] this invention person consequently, the configuration of the iontophoresis polar zone (operation lateral electrode section) of iontophoresis equipment For example, the iontophoresis electrode material connected to the electrification ion of the effective drugs component of the ionicity drugs indicated in patent application official announcement Taira No. 504343 [three to] etc., and a power source of the same kind (operation lateral electrode material), The ionicity drugs arranged at the front section of said iontophoresis electrode material, And it sets to the iontophoresis polar zone (operation lateral electrode section) which consists of ion exchange membrane which chooses the electrification ion of the effective drugs component of said ionicity drugs arranged at the side which contacts the skin of the front section of said ionicity drugs, and ion of the same kind. Even if there is little (i). aforementioned iontophoresis electrode material about the configuration between said iontophoresis electrode material and ionicity drugs, in view of said iontophoresis electrode material side, while arranging conductive media, such as a physiological saline, in the front section (ii) When the ion exchange membrane which chooses the electrification ion of the effective drugs component of ionicity drugs and opposite ion as the front section of the . aforementioned conductivity medium was arranged and constituted, it found out that the fault in the above mentioned iontophoresis polar zone was canceled.
[0019] Furthermore, although arranging ion exchange membrane in a grand polar-zone (non-acting lateral electrode section) side in the iontophoresis equipment using the conventional ion exchange membrane is not known at all, this invention person the configuration of the grand polar zone (non-acting lateral electrode section) -- in view of the electrode material side of the grand polar zone . (iii) grand electrode material, while arranging conductive media, such as a physiological saline, in the front section at least (iv) . When the ion exchange membrane which chooses the electrification ion of the effective drugs component of ionicity drugs and opposite ion as the front section of said conductive medium was arranged and constituted, it found out that the fault in the above mentioned grand polar zone was canceled.
[0020] furthermore -- again -- this invention person -- the configuration of the grand polar zone -- the ion exchange membrane of (v). above (iv) -- in addition, when the ion exchange membrane from which ion permselectivity differs further was arranged and constituted, it found out that the living body safety in the grand polar zone was maintainable to altitude.
[0021] Moreover, in the iontophoresis polar zone and the grand polar zone, this invention person found out that the energization property in the two-electrodes section was sharply improvable especially, when constituted from conductive media, such as a physiological saline containing the matter (matter which is easy to carry out oxidation reduction rather than water) which has an oxidation reduction potential lower than (vi). electrolysis-of-water potential for each conductor medium.
[0022] This invention uses the above mentioned knowledge as the base, and is the above (i). The iontophoresis equipment which has the configuration, the iontophoresis (it incorporated) polar zone (operation lateral electrode section) which unified the above (v) and/or the configuration of (vi) further, and grand polar zone (non-acting lateral electrode section) of - (iv) is offered.
[0023] especially -- this invention -- the above (i) the configuration of - (iv) -- further -- the

above (v) and/or, the configuration of (vi) -- unifying (it incorporating) -- an error when changing the combination of electrode material and ion exchange membrane in relation with the ion property of ionicity drugs is prevented, and the iontophoresis equipment of the new structure which provided the means which makes it possible to prescribe ionicity drugs for the patient efficiently is offered. The new iontophoresis equipment which can realize administration (drug delivery) of the ionicity drugs by iontophoresis with the administration effectiveness of ionicity drugs high under the energization condition (constant current and/or condition of a constant voltage) stabilized for a long period of time and and the high living body safety which prevented a burn, inflammation, etc. of a skin side by this invention is offered.

[0024]

[Means for Solving the Problem] In the iontophoresis equipment which has the iontophoresis polar zone (operation lateral electrode section) linked to the power source which will be used in order that this invention may prescribe ionicity drugs for the patient by iontophoresis if this invention is outlined, and the grand polar zone (non-acting lateral electrode section) (1) Electrode material by which the . aforementioned iontophoresis polar zone was connected to the electrification ion of (1)-1. ionicity drugs, and a polar power source of the same kind, (1) The conductive medium of the -2. aforementioned electrode material arranged in the front face at least, (1) Ion exchange membrane which chooses ion opposite to the electrification ion of the ionicity drugs arranged in the front face of the -3. aforementioned conductivity medium, (1) Ionicity drugs arranged in the front face of the ion exchange membrane which chooses ion opposite to the electrification ion of the -4. aforementioned ionicity drugs, And the thing which consists of ion exchange membrane which chooses the electrification ion of the ionicity drugs arranged in the front face of the (1)-5. aforementioned ionicity drugs, and ion of the same kind, And polar electrode material with (2). aforementioned grand polar zone opposite to the electrode material of the (2)-1. aforementioned iontophoresis polar zone, (2) It consists of ion exchange membrane which chooses ion opposite to the electrification ion of the ionicity drugs arranged in the front face of the conductive medium of the -2. aforementioned electrode material arranged in the front face at least, and the (2)-3. aforementioned conductivity medium, Furthermore, in (3). aforementioned iontophoresis polar zone and the grand polar zone, the iontophoresis polar zone is related with the iontophoresis equipment characterized by being constituted so that it may be equipped free [attachment and detachment of other components] to an electrode material element at least.

[0025] Moreover, in order that this invention may raise the engine performance of iontophoresis equipment of having said iontophoresis polar zone (operation lateral electrode section) and the grand lateral electrode section (non-acting lateral electrode section) (i) the conductive medium of . iontophoresis polar zone and the grand polar zone It is what is characterized by containing the matter which oxidizes or is easy to be returned, and being constituted. More specifically (ii) It is characterized by for the conductive medium of . iontophoresis polar zone and the grand polar zone containing a ferrous sulfate, ferric sulfate or an organic acid, its salt, etc. as matter which oxidizes or is easy to be returned, and constituting it.

[0026] Furthermore, this invention is characterized by for the grand polar zone (non-acting lateral electrode section) being what used together the KAOCHIN exchange film and the anion exchange film, and constituting it again in order to raise the engine performance of said iontophoresis equipment. In addition, the point which uses the ion exchange membrane (the ion selectivity of the ion conversion film changes with electrification polarities of ionicity drugs.) of one sheet for the above mentioned grand polar zone, and the point which uses further two sorts of ion exchange membrane from which ion selectivity differs for the grand polar zone are not seen at all by the conventional technique.

[0027] Moreover, as this invention was described above, the iontophoresis equipment of this invention arranges in the iontophoresis polar zone and the grand polar zone two or more ion exchange membrane from which ion selectivity differs, and although the arrangement mode of the ion exchange membrane concerned is used in relation with the electrification ion of ionicity drugs, changing, it is characterized by to offer iontophoresis equipment excellent in the operability which saved labor the arrangement activity and exchange of said ion exchange

membrane, and convenience.
[0028] Hereafter, the engineering construction of this invention is explained in more detail. First, in order to acquire an understanding of this invention, the prescribing [for the patient]-a medicine method and trouble of the ionicity drugs by the conventional iontophoresis, and the focus of the method of prescribing the ionicity drugs of this invention for the patient are explained using the basic block diagram of the iontophoresis equipment of this invention. Subsequently, the concrete configuration of the iontophoresis equipment of this invention is explained. In addition, although a drawing is referred to in order to explain the engineering construction of this invention, the thing of a drawing display should be interpreted as one mere embodiment, and it is needless to say that this invention is not limited to the thing of these drawings.
[0029] Drawing 1 - drawing 2 show the basic block diagram of the iontophoresis equipment (X) with which the iontophoresis polar zone (1) and grand polar zone (2) of this invention were formed in un-one body. Drawing 1 shows a perspective view and drawing 2 shows an important section sectional view. In addition, drawing 1 - drawing 2 show the method (drug delivery) of prescribing for the patient the ionicity drugs by the new iontophoresis realized by the iontophoresis equipment (X) of this invention to coincidence.
[0030] Drawing 3 shows the basic block diagram (important section sectional view) of the iontophoresis equipment (X) when prescribing ionicity drugs for the patient on condition that the following in the iontophoresis equipment (X) of this invention shown in said drawing 2 .
(i) The sodium (Na) salt (it may be hereafter written as As-Na+) of an ascorbic acid (vitamin C) is used as . ionicity drugs.
(ii) . A physiological saline (Na+Cl-water solution) is used as a conductive medium. In addition, in this invention, in order to remove the fault originating in electrode reaction as said physiological saline, what added the matter with which the oxidation reduction of the ferrous sulfate and ferric sulfate which have an oxidation reduction potential lower than the electrolytic potential of water, or the organic acid is easy to be carried out may be used.
(iii) Let . iontophoresis polar zone (operation lateral electrode section) be cathode (- pole).
(iv) . Let the grand polar zone (non-acting lateral electrode section) be an anode plate (+ pole).
(v) The class (permselectivity of ion) and arrangement part of ion exchange membrane of which . use is done are carried out as illustration.
[0031] Drawing 4 shows the basic block diagram of the iontophoresis equipment (X) of this invention which raised further the engine performance of the iontophoresis equipment (X) shown in said drawing 3 . The thing of drawing 4 is different as compared with the thing of said drawing 3 in that the ion exchange membrane of the grand polar zone (2) is constituted by using together cation exchange membrane (23) and the anion exchange film (25) so that it may be illustrated.
[0032] In said drawing 1 - drawing 4 , the reference mark in drawing corresponds to the sign of each component of the iontophoresis equipment explained by the term of the above "The means for solving a technical problem." For example, "(1) -1" of the component of said iontophoresis equipment (X) All over drawing, it is displayed as "11."
[0033] Drawing 5 - drawing 6 show the basic block diagram of the iontophoresis equipment (X) with which the iontophoresis polar zone (1) and grand polar zone (2) of this invention were formed in one, and are drawing corresponding to said drawing 1 - drawing 2 .
[0034] The greatest focus of the iontophoresis equipment (X) of this invention From the purpose of this kind of iontophoresis making ionicity drugs drive to the inside of the body through the skin (or membrane) under predetermined electromotive force (transportation) The amount of the ion which moves with fixed electromotive force in the conventional technique (this is known well and it is in it that it is dependent on the concentration of ion, the mobility of ion, and the valence of ion.) Especially this invention is in the point which is reconstructing the iontophoresis technique from there to having paid the big interest to the point paying attention to the fault factor (negative factor) based on electrochemical reaction paying attention to the electrochemical reaction of each electrode section.
[0035] In iontophoresis, as for an electrode section, electrochemical reaction, i.e., a certain oxidation reaction (anode plate) and reduction reaction (cathode), occurs inevitably. According to

said electrochemical reaction, and for example, generation of the harmful matter by electrolysis of the physiological saline which is a conductive medium (For example, generation of the hypochlorous acid resulting from Cl- known as a powerful oxidizer in an anode plate), Rapid pH change (rapid souring in an anode plate, rapid alkalinity-izing in cathode), Or generating (for example, H2 [Generating of gas] in cathode O2 in gas and an anode plate gas and Cl2) of air bubbles etc. takes place. For this reason, a fatal fault is invited in operation of iontophoreses, such as a bad influence to the body skin, a skin stimulus, and energization impossible (increase of the resistance accompanying the generation of gas).

[0036] This invention uses as the base to cancel the fault based on the electrochemical reaction which occurs in said electrode section in iontophoresis, and attains the advancement of an iontophoresis technique, and a tendency to heighten the added value.

[0037] In order that the iontophoresis equipment (X) of this invention may cancel the above mentioned fault seen by the method of prescribing the conventional ionicity drugs for the patient Engineering construction element (1)-2-(1) -3 of this invention described above as compared with the thing of the conventional technique as a configuration of (i). iontophoresis polar zone (operation lateral electrode section) (1) as shown in drawing 2 - drawing 3 (drawing 2 - drawing 3 are shown by reference marks 12-13.) Adding and (ii). The focus is to add engineering construction element (2)-2-(2) -3 (for drawing 2 - drawing 3 to be shown by reference marks 22-23.) of above mentioned this invention as a configuration of the grand polar zone (non-acting lateral electrode section) (2).

[0038] Furthermore, the iontophoresis equipment (X) of this invention As shown in drawing 4 as compared with the conventional thing, as a configuration of . (iii) grand polar zone (non-acting lateral electrode section) (2) Cation exchange membrane (23) and the anion exchange film (25) are used together as an ion exchange membrane, and (iv). Said focus (i) carried out the iontophoresis polar zone (1) which it has, and said focus (ii) carried out -- or (iii) In the iontophoresis equipment (X) with which the grand polar zone (2) which it has was carried out in un-unifying or one at least -- the iontophoresis polar zone (1) -- an electrode material element -- receiving -- other components -- attachment and detachment -- being free (detachable) -- the focus is to be constituted so that it may be equipped.

[0039] In short, the iontophoresis equipment (X) of this invention has the focus in using the ion exchange membrane of at least one sheet for the iontophoresis polar zone with careful attention to the permselectivity of ion at the ion-exchange-membrane and grand polar-zone side of two sheets, if the viewpoint of use of ion exchange membrane is observed in order to cancel the fault resulting from the above mentioned electrode reaction seen by the method of prescribing the conventional ionicity drugs for the patient. Moreover, since the iontophoresis equipment (X) of this invention is premised on using two or more ion exchange membrane from which ion permselectivity differs as an important component, and changing the arrangement mode of ion exchange membrane (or [that the active principle of ionicity drugs is charged in forward or negative]) with the property of the electrification ion of ionicity drugs as described above, the focus is to have saved labor the arrangement activity and exchange of said ion exchange membrane.

[0040] Again furthermore, the iontophoresis equipment (X) of this invention In order to cancel the fault resulting from the above mentioned electrode reaction seen by the method of prescribing the conventional ionicity drugs for the patient the arrangement voice of said ion exchange membrane of the specification carried out -- like -- in addition, (v). The focus is to adopt the thing containing the matter which oxidizes or is easy to return as compared with the electrolysis of water as a conductive medium of the two-electrodes section (iontophoresis polar zone and grand polar zone).

[0041] Hereafter, the case which used sodium ascorbate (As-Na+) as ionicity drugs explains the above mentioned focus which the iontophoresis equipment (X) of this invention has. In this case, it is needless to say that the electrification ion of the effective drugs component of ionicity drugs turns into an anion (As-). For this reason, as shown in drawing 3 - drawing 4 , the iontophoresis polar zone (1) becomes cathode (- pole), and the grand polar zone (2) becomes an anode plate (+ pole). In addition, although it is needless to say, when ionicity drugs are what is

dissociated to forward electrification ion, it is needless to say that the above mentioned polarity of the polar zone and the class (selection property of ion) of ion exchange membrane will become respectively opposite.
[0042] In drawing 1 which shows the basic configuration of the iontophoresis equipment (X) of this invention - drawing 6 , in 1, the grand polar zone (non-acting lateral electrode section) and 3 show a power unit, and, as for the iontophoresis polar zone (operation lateral electrode section) and 2, 4 shows the skin (or membrane).
[0043] Said iontophoresis polar zone (operation lateral electrode section) (1) It is (i). as shown in drawing 3 - drawing 4 . The negative(-) pole (11) and (ii). A conductive medium (12), 0.9%NaCl water-solution (iii) . cation-exchange-membrane (13) and (iv). which specifically contained 1 MAs-Na+ ionicity drugs (14) -- concrete -- a 1 MAs-Na+ water solution and (v). It is constituted more by the anion exchange film (15).
[0044] said grand polar zone (2) -- the case of drawing 3 -- (i). The forward (+) pole (21) and (ii). a conductive medium (22) -- it is specifically constituted more by 0.9%NaCl water solution and . (iii) cation exchange membrane (23).
[0045] In this invention moreover, said grand polar zone (2) As shown in drawing 4 , it sees in the direction of the skin (4) from the forward (+) pole (21). (i) . The forward (+) pole (21) and (ii). A conductive medium (22), 0.9%NaCl water solution, . (iii) anion exchange film (25) which specifically contained 1 MAs-Na+, (iv) . A conductive medium (24), (v). It may be constituted more by cation exchange membrane (23) and 0.9%NaCl water solution which specifically contained 1 MAs-Na+.
[0046] It sets to this invention, and the conductive medium (12 22) of said two-electrodes section (1 2) is a thing containing the compound which oxidizes and is easy to return as compared with an electrolysis-of-water reaction (oxidation and the reduction reaction of water), and may be constituted. Moreover, in this invention, generally, since the oxidation reduction potential is lower than water, ionicity drugs (for example, above mentioned As-Na+) may contain the conductive medium (12 22) of said two-electrodes section (1 2) as a compound which is easy to carry out oxidation reduction of these ionicity drugs. Also in the conductive medium (24) of the grand polar zone (2) shown in drawing 4 , the same thing can say this point.
[0047] Hereafter, subsequently with reference to the basic block diagram of the iontophoresis equipment (X) of this invention, it explains in the configuration of the more concrete iontophoresis equipment (X) for enforcing the new method of prescribing ionicity drugs for the patient, i.e., the concrete configuration of the iontophoresis polar zone (operation lateral electrode section) (1), and order called the concrete configuration of the grand polar zone (non-acting lateral electrode section, ground polar zone) (2).
[0048] What is necessary is for the electrode plate (11) of the iontophoresis polar zone (operation lateral electrode section) (1) to be a desired thing, and just to constitute it in the iontophoresis equipment (X) of this invention. Moreover, what is necessary is to be a desired thing and for the electrode material (12) of the grand polar zone (non-acting lateral electrode section) (2) just to also constitute. For example, what is necessary is just to constitute from an inert electrode which consists of conductive ingredients, such as carbon and platinum.
[0049] In the iontophoresis equipment (X) of this invention, the active electrode which replaces with the above mentioned inert electrode as said electrode material (11 12), and is known for the iontophoresis field may be adopted. If an example of the above mentioned active electrode is given, when the drugs component of ionicity drugs serves as forward (+) ion and it will specifically use morphine hydrochloride and a lithium chloride (the morphine ion and lithium ion which are a drugs component turn into a cation in this case, and the chlorine of a counter ion serves as an anion.) as ionicity drugs, there are these counter ions, a silver electrode which reacts as anode plate (+) material. In the case of the above mentioned active electrode, a silver electrode and a chlorine ion (Cl-) react easily, and insoluble AgCl generates them by Ag+Cl-->AgCl+e-. Since the advantage of using said active electrode has the standard potential of said reaction lower than the standard potential of the electrolysis-of-water reaction in an anode plate (+), it is to be able to prevent an electrolysis-of-water reaction. Therefore, rapid souring based on H+ ion in an anode (positive electrode) and rapid alkalinity-ization based on OH-ion in a cathode (negative electrode) are prevented.

[0050] However, in the iontophoresis equipment (X) of this invention, as described above, in order to use two or more film of ion exchange membrane with which ion selectivity differs, and at least three sheets or more for an iontophoresis system, since insoluble matter (insoluble particulate matter), such as a silver chloride (AgCl) generated with an active electrode, may check the property of ion exchange membrane, the use should fully be cared about. Since it described above, in order to use the ion exchange membrane of two or more sheets from which ion selectivity differs, as for the iontophoresis equipment (X) of this invention, it is desirable not to use special electrode material called an active electrode, but to use a more economical inert electrode. Moreover, in an iontophoresis system, since the metal ion inevitably generated from electrode material is conveyed and the iontophoresis effectiveness falls only at this rate, as electrode material of the iontophoresis equipment (X) of this invention, a carbon electrode is desirable.

[0051] In the iontophoresis equipment (X) of this invention shown in drawing 3 , the conductive medium (12) arranged so that the perimeter of the electrode material (11) of the negative(−) pole of the iontophoresis polar zone (1) may be touched is constituted including the compound which is easy to be returned. Moreover, in the iontophoresis equipment (X) of this invention shown in drawing 3 , the conductive medium (22) arranged so that the perimeter of the electrode material (21) of the forward (+) pole of the grand polar zone (2) may be touched is constituted including the compound which is easy to oxidize. It is needless to say that the arrangement part of the above mentioned compound which oxidizes or is easy to be returned deals with the electrochemical reaction in each electrode plate, i.e., the reduction reaction in the negative (−) pole, and oxidation reaction on the forward (+) pole.

[0052] In the middle of the conductive medium (12) containing the compound which is easy to be returned so that it may be illustrated, and ionicity drugs (As−Na+) (14), cation exchange membrane (13) is arranged and the iontophoresis polar zone (1) of the iontophoresis equipment (X) of this invention shown in drawing 3 is constituted. And in relation with a configuration of having described above, this invention arranges the conductive medium (12) containing said compound which is easy to be returned so that the electrode material (11) of the negative(−) pole may be touched, but said conductive medium (12) plays an important role so that it may mention later. This point is the same also about the conductive medium (22) containing the compound with which a grand polar−zone (2) side tends to oxidize.

[0053] In this invention, as a compound which is added by said conductive medium (12) and which oxidizes or is easy to be returned The thing excellent in living body safety, economical efficiency (cheap and ease of acquisition), etc. is desirable. For example, physic agents, such as inorganic compounds, such as a ferrous sulfate and ferric sulfate, an ascorbic acid (vitamin C), and sodium ascorbate, Organic acids, such as an acid compound which exists in skin sides, such as a lactic acid, or oxalic acid, a malic acid, a succinic acid, and a fumaric acid, the salt of those, etc. can be illustrated.

[0054] In the compound which oxidizes or is easy to return rather than the electrolysis reaction (oxidation with a positive electrode, and reduction with a negative electrode) of the above mentioned water, a ferric ion returns ferric sulfate to the first iron ion easily in a negative electrode. Moreover, in a positive electrode, as for a ferrous sulfate, the first iron ion oxidizes to a ferric ion easily. Although this mentions later in detail, the fault originating in the electrolysis reaction of water can be removed, and the iontophoresis equipment (X) of the engine performance which was excellent in relation to the arrangement mode of the specific ion exchange membrane of this invention is offered.

[0055] In this invention, said conductive medium (12) is for securing energization nature, and brine, a physiological saline, etc. are the examples of a type. What is necessary is just to constitute in a request the configuration which sets to the iontophoresis equipment (X) of this invention, and holds or holds said conductive medium (12). Moreover, said conductive medium (12) may be a thing solution type [for example,] or the thing of a type into which desired media (gauze, water absorbing polymer ingredient, etc.) were infiltrated.

[0056] Here, the advantage which uses the thing containing said compound which oxidizes or is easy to return as said conductive medium (12) is explained in detail. In the iontophoresis polar

zone (1) and the grand polar zone (2), an electrochemical reaction arises and disassembly of an electrolytic solution and disassembly of ionicity drugs arise. As this result, air bubbles are generated in the electrode interior of a room, and contact in the polar zone and an electrolysis room solution is barred. For example, it is H2 to a negative electrode. It is Cl2 to gas and a positive electrode. And O2 Gas occurs. If such a situation occurs, resistance becomes large with air bubbles, and however it may apply an electrical potential difference, a current will not flow. In the case of the above mentioned As-Na+ delivery, the energization which carried out long duration (30 minutes or more) stability becomes impossible. This is a very big problem, in view of the viewpoint of the practicality of iontophoresis equipment.

[0057] In order to remove the above mentioned instability factor, to be stabilized and to perform iontophoresis, it is very important to control generating of air bubbles. In order to attain the above mentioned purpose, the method of putting the matter which is easy to undergo oxidation or a reduction reaction, without generating air bubbles into each electrode room is useful. That is, if water is oxidized or returned, oxygen or hydrogen will occur, but in order to control these reactions, a ferrous sulfate, ferric sulfate, an ascorbic acid, or its sodium salt is added in an electrode room solution (electrode liquid). For example, when using sodium ascorbate, in the electrode which oxidation reaction produces, sodium ascorbate can carry out oxidization decomposition instead of generating of oxygen arising, arcorbic-acid sodium can carry out reduction decomposition instead of generating of hydrogen arising in the electrode which a reduction reaction produces, and generating of the air bubbles of the oxygen which spoils the stability of an energization property by this, or hydrogen can be controlled.

[0058] As described above, by using self-sacrificingly the matter (matter which has an oxidation reduction potential lower than the oxidation reduction potential of water) which sets to the electrochemical reaction of sodium ascorbate etc., and is easily oxidized or returned rather than water, generating of the gas (gas) in the electrode interior of a room can be controlled, and the iontophoresis equipment (X) which makes possible operation stabilized more is obtained. In this invention, if disassembly of water other than the above mentioned ferrous sulfate, ferric sulfate, and an ascorbic acid is controlled in response to oxidation reduction as said self-sacrificing matter, it will be needless to say that all can be used. In addition, in the case of the sodium ascorbate as said self-sacrificing matter, sodium ascorbate will change to dehydroascorbic acid, 2, a 3 diketo 6-gulonic acid, etc. with the electrode (+ pole) which (ii). oxidation reaction produces in CO2, H2CO3, etc. in the electrode (- pole) which (i). reduction reaction produces.

[0059] A desired thing can be used for said cation exchange membrane (13) in the iontophoresis equipment (X) of this invention. As described above, the anion exchange film (15) other than cation exchange membrane (13) is used for the iontophoresis equipment (X) of this invention. Here, the example of both said cation exchange membrane (13) used by this invention and anion exchange film (15) is explained.

[0060] In this invention, Tokuyama Neosepta (CM-1, CM-2, CMX, CMS, CMB, etc.) can be used as said cation exchange membrane (13).

[0061] In this invention, Tokuyama Neosepta (AM-1, AM-3, AMX, AHA, ACH and ACS, ACS-3, etc.) can be used as said anion exchange film (15).

[0062] What is necessary is just to constitute in a request the configuration which sets to the iontophoresis equipment (X) of this invention, and holds or holds ionicity drugs (As-Na+) (14). Moreover, said ionicity drugs (14) may be the thing of the type of a solution, or the thing of a type into which desired media (gauze, water absorbing polymer ingredient, etc.) were infiltrated.

[0063] In the iontophoresis equipment (X) of this invention, the anion exchange film (15) with which the front face of said ionicity drugs (As-Na+) (14), i.e., the ion exchange membrane arranged in a skin side, has the electrification ion (As-) of the drugs component of ionicity drugs and ion selectivity of the same kind is used.

[0064] By the engineering construction of the iontophoresis polar zone (1) of the iontophoresis equipment (X) of above mentioned this invention, the stable long-period-of-time and iontophoresis effectiveness and living body safety can be obtained rather than the conventional method. namely, said engineering construction of the iontophoresis polar zone (1) carried out — a long period of time -- and — if the stable energization property can be acquired and another

word is carried out -- ionicity drugs -- the skin (4) -- minding -- a long period of time -- and it can be stabilized, and the inside of the body can be made to permeate efficiently (drug delivery), and generation of the harmful matter by the electrolysis reaction in the polar zone can be prevented.

[0065] Next, the configuration of the grand polar zone (+ electrode) (2) of the iontophoresis equipment (X) of this invention is explained with reference to a basic block diagram.

[0066] Probably because the simple view of only taking touch-down (ground) is committing the conventional technique about iontophoresis strongly about the configuration of the grand polar zone (ground polar zone), the present condition is that the thing in consideration of the stable reservation of an energization property, the stable reservation of living body safety, etc. is not proposed. This is the patent application official announcement explained by the term of the above "a Prior art". Even if it sees the Taira No. 504343 [three to] official report, JP,3-94771,A, and JP,4-297277,A related to an applicant for this patent, it is just going to ****.

[0067] In addition to the configuration of said iontophoresis polar zone (1) of iontophoresis equipment (X), engineering construction which is different from the former also about the grand polar zone (2) in relation with the overall configuration of equipment from a viewpoint that it is stabilized and administration of long-period-of-time and ionicity drugs by iontophoresis can be performed and that advanced living body safety is obtained is used for this invention.

[0068] As shown in drawing 2 , the grand polar zone (2) of the iontophoresis equipment (X) of this invention Polar electrode material opposite to the electrode material (11) of said iontophoresis polar zone (1) (21), It is constituted by the ion exchange membrane (23) which is arranged in the front section of the conductive medium (22) of said electrode material (21) arranged in the front face at least, and said conductive medium (22), i.e., a skin (4) side, and chooses ion opposite to the electrification ion of ionicity drugs.

[0069] In the iontophoresis equipment (X) of this invention, as shown in drawing 5 - drawing 6 , in order that the grand polar zone (2) may raise operability, convenience, etc., it may unite with the iontophoresis polar zone (1), and may be constituted.

[0070] in order that [and] this invention may raise the operability of iontophoresis equipment (X), and convenience further -- the grand polar zone (2) -- the iontophoresis polar zone (1) -- unification or the un-unified iontophoresis equipment (X) -- setting -- at least -- the iontophoresis polar zone (1) -- electrode material (11) -- receiving -- other components -- attachment and detachment -- being free (detachable) -- it is constituted so that it can equip. In addition, in this invention, it is needless to say that in addition to said iontophoresis polar zone (1) you may be constituted also in the grand polar zone (2) so that it can equip free [attachment and detachment of other components] to electrode material (21).

[0071] In the iontophoresis equipment (X) of this invention, the point which arranges ion exchange membrane (23) in the grand polar zone (2) in order to raise living body safety is the big focus which is not seen by the conventional technique. Moreover, in the iontophoresis equipment (X) of this invention, in order to aim at long-term stable actuation with living body safety, the conductive medium (22) of the grand polar zone (2) is a thing containing the matter which has a low oxidation reduction potential, and may consist of oxidation reduction potentials of water. [as well as the conductive medium (12) of the iontophoresis polar zone (1)] And considering as the iontophoresis equipment (X) of high added value combining the point which arranges ion exchange membrane (23) in said grand polar zone (2), and the point of using said matter which oxidation reduction is easy to be carried out is also the big focus which is not seen by the conventional technique.

[0072] In the iontophoresis equipment (X) of this invention, the grand polar zone (2) is what arranged the ion exchange membrane (23) of one sheet which has predetermined ion selectivity as shown in drawing 2 , and may be constituted. The advantage of arranging an ion exchange membrane (23) in the above mentioned grand polar zone (2) has actual proof data, and is mentioned later. Moreover, the advantage of adding the matter which oxidation reduction is easy to be carried out to the conductive medium (22) of the grand polar zone (2) is as by the way the conductive medium (12) of the iontophoresis polar zone (1) having already explained.

[0073] As shown in drawing 3 , when ionicity drugs are charged in negative (-), such as sodium

ascorbate (As-Na+), in the grand polar zone (2) of the iontophoresis equipment (X) of this invention, an anode plate (+) and a conductive medium (22) are constituted by the physiological saline, and an ion exchange membrane (23) is constituted more for electrode material (21) by cation exchange membrane.

[0074] In this invention, the conductive medium (22) of said grand polar zone (2) may consist of physiological salines containing the matter which oxidation reduction is easy to be carried out, for example, ferric sulfate, the ferric sulfate (both equimolecular solution) containing a ferrous sulfate, an ascorbic acid, sodium ascorbate, etc. Furthermore, the grand polar zone (2) of this invention may use two sorts of ion exchange membrane from which ion selectivity differs as ion exchange membrane again, as shown in drawing 4 .

[0075] The method of prescribing for the patient the ionicity drugs by the iontophoresis explained with reference to the iontophoresis equipment (X) shown in drawing 3 was the thing of the case of ascorbic-acid Na (As-Na+) where the effective drugs component of ionicity drugs is charged in negative (-) as described above. In this invention, even if the effective drugs component of ionicity drugs is charged in forward (+), a medicine can be similarly prescribed for the patient.

[0076] The procaine hydrochloride as a narcotic, lidocaine hydrochloride, etc. are one of those to which the effective drugs component of ionicity drugs is charged in forward (+), for example. In this case, it is needless to say that the polarity of each electrode material (11 12) and the ion-exchange property of an ion exchange membrane must be made completely contrary to the administration case of said ascorbic-acid Na (As-Na+). When using the ionicity drugs charged in said forward (+), you can understand the focus of this invention easily by guessing the administration case of ascorbic-acid Na charged in said negative (-).

[0077] A desired thing can be used as a power unit (3) shown in said drawing 1 - drawing 6 . In this invention, a cell, a voltage stabilizer, constant current equipment, a constant voltage, constant current equipment (GARUBANO equipment), etc. can be used as said power unit (3).

[0078] Next, the example of an experiment / example of comparative experiments when conducting the administration experiment of the sodium ascorbate (As-Na+) as ionicity drugs are explained using the experimental device which changed and manufactured said experimental device for extracting the basic block diagram of the iontophoresis equipment (X) shown in said drawing 3 - drawing 4 , the experimental device of equivalence, and comparison data. By the example of an experiment / example of comparative experiments explained below, he can understand the importance of arranging ion exchange membrane in the grand polar zone (2) especially in the iontophoresis equipment (X) of this invention.

[0079] Drawing 7 - drawing 10 are the schematic diagrams of the used experimental device. Drawing 7 - drawing 8 are equipment for comparative experiments. Drawing 9 - drawing 10 are the iontophoresis equipment (X) of this invention, and the experimental device of equivalence. The semantics of the reference mark of an experimental device is as follows.

(1) The . reference marks 11, 21, 12, 13, 14, 15, 22, 23, 24, and 25 are the same as drawing 3 - drawing 4 . In addition, Tokuyama Neosepta CMX (cation) and AMX (anion) was used, respectively as cation exchange membrane (13 23) and anion exchange film (15 25).

(2) The . reference mark 4 shows the virtual skin tub (room) which supposed the skin.

(3) The . reference mark PP shows the diaphragm (AN filter by the Nihon Millipore Limited, Inc., AN06) of the porosity made from polypropylene. (Note) PP does not have the permselectivity of ion.

(4) . reference mark A-E shows each tub (room) divided by ion exchange membrane or PP.

[0080] 1. 0.9%NaCl water solution which dissolved As-Na+ of 1M was used for the iontophoresis (experiment a) . experiment condition (1).A room (an iontophoresis electrode room, negative-electrode room) electrode liquid in the experimental device shown in drawing 7 including a conductive medium (12) and ionicity drugs (14).

(2) The NaCl water solution was used 0.9% as a .B room (virtual skin room which simulated the skin) medium.

(3) The NaCl water solution was used 0.9% as a conductive medium (22) of .C room (grand electrode room).

(4) . energization condition electrical-potential-difference 30V (initial value), 10mA (constant current) of currents, resistance-welding-time 30 minutes.
(b) . experimental result: -- pH change of each ** (A-C) is shown in the following table 1 as an experimental result.
[0081]
[Table 1]

	A	B	C
0 分	6. 88	6. 24	6. 24
30分	9. 93	4. 20	1. 66

[0082] (c) . consideration: -- in (1).A room, at a reduction reaction and C room, oxidation reaction arises and As[of A rooms]- (ascorbic-acid ion) is conveyed to B rooms. Clearly, by A rooms, pH is shifted from neutrality to an alkalinity side, and is changing from neutrality to strong acidity at C room. Therefore, the case of this experiment of being directly in contact has the grand electrode (21) of C room, and B rooms (4), i.e., the skin, in a very dangerous condition. This is the acid (HClO3) which B rooms' having shifted to acidity and the cause of the shift to said acidity side generated at C room. It understands from it being what is depended. In addition, said hypochlorous acid is known as a powerful oxidizer.
(2) Although it is somewhat prevented that A rooms become alkali since the anion exchange film (15) exists between A rooms which are . iontophoresis electrode rooms, and the skin (B rooms), it is OH of A rooms. - In order to pass ion by electrophoresis to a B room side through said anion exchange film (15), a skin front face is considered to be alkali locally. That is, although it is thought that it inclines to an acidity side more in B rooms, it has stopped at pH=4.20, and it is thought that OH-ion arrived at the skin side and has shifted pH to an alkali side locally.
(3) In performing iontophoresis, since . above of was done, the mode which uses one ion exchange membrane like this experiment should be avoided from a viewpoint of living body safety.
(4) The amount of As- (ascorbic-acid ion) prescribed for the patient in . book experiment is about 300microtheoretical-value (mol) mol of 560micro, and supports the decrement of A rooms, and the augend of B rooms mostly. However, it is about 1 of theoretical value/2, in A rooms, a lot of OH-ion generated said dose, and since this is conveyed with As-, it has blocked transportation of As- 50%. Also from this point, this experimental device is unsuitable as iontophoresis equipment.
[0083] Iontophoresis (Experiment a) . Experiment Conditions in Experimental Device Shown in Drawing 8 : 2. Use Experimental Device Which Arranged and Reconfigurated Cation Exchange Membrane (13) and Anion Exchange Film (15) in Mode of Illustration of Configuration of A Rooms and B Rooms (Skin) of Experimental Device Shown in Said Drawing 7 . And it experimented like the above "1" except having used 0.9%NaCl water solution which dissolved As-Na+ of 1M which contain a conductive medium (12) and ionicity drugs (14), respectively as the electrode liquid of A rooms, and an ionicity drugs solution of B rooms.
(b) . experimental result: -- pH change of each ** (A-D) is shown in the following table 2 as an experimental result.
[0084]
[Table 2]

	A	B	C	D
0 分	6. 88	6. 92	6. 91	6. 56
30分	9. 98	6. 86	5. 50	1. 45

[0085] (c) By dividing with cation exchange membrane (13) between a . consideration (1). iontophoresis electrode room (A rooms) and the solution room (B rooms) containing As-Na+ as ionicity drugs which are administration reagents, pH of B rooms can be kept constant. This prevents that a skin front face (C room) becomes alkalinity. Moreover, the amount of ion

transparency improves as compared with an experiment of the above "1", and the value almost near a theoretical value is acquired.
(2) The fall of pH of ., however C room (virtual skin tub) (4) is seen. this has suggested the effectiveness of not diaphragm [mere] (pp) coming out of between C room and D rooms (i.e., between a grand electrode room (D) and virtual skin tubs (4)), and dividing with ion exchange membrane. Furthermore, at a grand electrode room (D), a hypochlorite generates by the oxidative degradation of the physiological saline which is a conductive medium, and there is a danger that this will be spread on the skin again.
[0086] 3. The iontophoresis (experiment a) . experiment conditions in the experimental device shown in drawing 9 : it experimented like the above "2" except having changed into cation exchange membrane (23) the diaphragm made from PP between C room of the experimental device shown in said drawing 8 , and D room.
(b) . experimental result: -- pH change of each ** (A-D) is shown in the following table 3 as an experimental result.
[0087]
[Table 3]

	A	B	C	D
0 分	6. 88	6. 92	6. 91	6. 56
30分	9. 98	6. 86	5. 50	1. 45

[0088] (c) . consideration: -- this experiment is equivalent to the experiment by the iontophoresis equipment (X) of this invention. This experimental device has the description in the point which is what arranged the cation exchange membrane (23) of one sheet in the grand polar zone (2), and is constituted.
(1) Although pH change at . each electrode room, i.e., A rooms, and D room is seen, pH change on an As-Na+ solution room (B rooms) and the skin (C room) is controlled, and is effective. Furthermore, by arranging cation exchange membrane (23) in a grand electrode room (D room), harmful anions, such as a hypochlorite, are limited to D interior of a room, without making the skin contact, and Lycium chinense grows.
(2) In order that the amount of transparency of . ascorbic-acid ion may show the value of a theoretical value mostly, this experimental device is useful as iontophoresis equipment.
(3) As ., however an improving point of this experimental device, H+ ion generated by the electrolysis of water on the grand electrode (21) migrated through cation exchange membrane (23), souring of C room is brought about at the grand electrode room (D room) which touches a virtual skin tub (C room), and this point should be improved. For this reason, it is desirable to adopt cation exchange membrane and two sorts of ion exchange membrane of the anion exchange film as a grand polar-zone side as well as an in TOFOZE polar-zone side.
[0089] Iontophoresis (Experiment a) . Experiment Conditions in Experimental Device Shown in Drawing 10 : 4. In Experimental Device Shown in Said Drawing 9 In addition to cation exchange membrane (23), the anion exchange film (25) is arranged in a grand electrode room (D room) in the mode of illustration. And it experimented like the above "3" except having used 0.9%NaCl water solution which dissolved As-Na+ of 1M as electrode liquid of the newly divided grand electrode room (E rooms).
(b) pH change of each ** (A-E) is shown in the following table 4 as a . experimental result experimental result.
[0090]
[Table 4]

	A	B	C	D	E
0 分	6. 92	6. 91	6. 28	6. 91	6. 92
30分	9. 38	6. 98	6. 79	7. 00	6. 20

[0091] In the iontophoresis equipment which arranged the ion exchange membrane (23 25) of two sheets in the iontophoresis polar-zone side shown in (1). drawing 10 at the ion-exchange-

membrane (13 15) and grand polar-zone side of two sheets (c) . consideration: -- It is As to an iontophoresis polar-zone side (A-B room) to human being's inside of the body (C room). - It is supplied. And it is Na+ to a grand polar-zone side (E-D room) to human being's inside of the body (C room). It is supplied and is sodium ascorbate (As-Na+) as a result. It will be poured into the inside of the body. Since the matter except having described above is not injected into the inside of the body, this experimental device serves as an administration (drug delivery) means of insurance and effective ionicity drugs extremely.
(2) .pH change is hardly seen at B rooms, C room, and D room. It sets to (i). iontophoresis polar zone, and this is the ascorbic-acid ion (As-) of B rooms. It moves to a virtual skin tub (C room). And it is shown that NATOUMU ion (Na+) moved to the iontophoresis electrode room (A rooms), and it sets to the (ii). grand polar zone. It is shown that the sodium ion (Na+) of D room moved to the virtual skin tub (C room), and migration and ascorbic-acid ion (As-) moved to the grand electrode room (E rooms), and, thereby, pH change does not arise in each **.
[0092]
[Example] Next, the embodiment of the iontophoresis equipment (X) used in order to prescribe the ionicity drugs by the iontophoresis of this invention for the patient is explained in detail with reference to a drawing. In addition, in a reference drawing, for illustration clarification, ion exchange membrane (13, 15, 23, 25) is expressed as a wavy line, and some components (member), a component (member) comrade's joint format, or hatching is omitted. However, the configuration currently omitted in the drawing may be easily understood from explanation, other accompanying drawings, etc. of each embodiment.
[0093] Drawing 11 is drawing explaining the first embodiment of the iontophoresis equipment (X) of this invention, and is drawing of longitudinal section. this invention -- the first operative condition, as shown in drawing 9 , iontophoresis equipment [like] (X) is roughly classified and consists of three elements of the grand polar zone (2) constituted as another object to the iontophoresis polar zone (1) of the shape of said cylinder, and . (iii) constant voltage and (i). cylinder-like iontophoresis polar-zone (1) (ii). power-source for constant current (3) **.
[0094] In the iontophoresis equipment (X) shown in drawing 11 of this invention, the grand polar zone (2) is constituted as another object to the iontophoresis polar zone (1). The iontophoresis polar zone (11) and the grand polar zone (2) are the things of non-one apparatus like illustration, for example, said semantics of "being constituted as an exception object" is the thing of the structure of the iontophoresis healer grasping the grand polar zone (2), and taking touch-down (ground).
[0095] Moreover, the first operative condition, iontophoresis equipment [like] (X) is constituted on the assumption that the thing of this invention shown in drawing 11 for which ascorbic-acid Na (As-Na+) is prescribed for the patient by iontophoresis as ionicity drugs (14). For this reason, in the iontophoresis equipment (X) shown in drawing 11 , the reference mark of each component means the following thing.
(i) the electrode plate of the iontophoresis polar zone (1) shown by . (11) (-) a pole and the conductive medium of the iontophoresis polar zone (1) shown by (ii). (12) A physiological saline and the ion exchange membrane of the iontophoresis polar zone (1) shown by . (iii) (13) Cation exchange membrane and the ionicity drugs of the iontophoresis polar zone (1) shown by (iv). (14) The ion exchange membrane of the iontophoresis polar zone (1) shown by arcorbic-acid Na (As-Na+) and (v). (15) The anion exchange film and the electrode plate of the grand polar zone (2) shown by (vi). (21) (+) The ion exchange membrane of the grand polar zone (2) a pole and the conductive medium of the grand polar zone (2) shown by . (vii) (22) are indicated to be by the physiological saline and . (viii) (23) shows cation exchange membrane, respectively.
[0096] It sets to iontophoresis equipment [like] (X) the first operative condition. it is shown in drawing 11 -- as -- this invention -- the iontophoresis polar zone (1) The element shown by the reference mark (11-15) which it roughly classified, and two elements of cylinder-like object [container liner] (b) ** were consisted of by the cylinder-like outer case object (a) and (ii). non-conductive (i). non-conductive, and was described above under these elements (a, b) is held or held. What is necessary is for said element (a, b) just to consist of non-conductive plastics.
[0097] As shown in drawing 1 , the top view of the iontophoresis polar zone (1) of a configuration

of having described above is circular. And since said iontophoresis polar zone (1) is grasped by the hand and contacted by the request affected part, it is constituted by the thing of desired magnitude (an outer diameter, height). Moreover, as shown in drawing 11 , said outer case object (a) and container liner object (b) are the thing of the screwing type unified by screwing through the screw section formed in both contact side. However, in this invention, it may be unified by other methods and said outer case object (a) and container liner object (b) may be a thing an engagement type, a stop type, and fit-in type etc.

[0098] The supporter for cation-exchange-membrane (13) for having two incomes with the (i). aforementioned container liner object (b), and fixing cation exchange membrane (13) so that the outer case object (a) of the shape of said cylinder may be illustrated (a1), (ii) The hold section for ionicity drugs (14) for holding . ionicity drugs (14) (a2), The supporter for anion exchange film (15) for fixing . anion exchange film (15) (a3), (iii) (iv) It has a lock-pin (a32) for fixing the press ring for anion exchange film (15) (a31) for fixing . anion exchange film (15), and (v). anion exchange film (15), and is constituted.

[0099] And the iontophoresis equipment (X) of this invention has the big focus in at least one component of the above mentioned cation exchange membrane (13), ionicity drugs (14), and the anion exchange film (15) being beforehand constituted by the outer case object (a) using the outer case object (a) arranged or held, in order to raise the operability and convenience. in addition, this invention -- setting -- as ionicity drugs -- the active principle of ionicity drugs -- negative -- said sodium ascorbate charged in (-) -- replacing with -- forward -- when using the morphine hydrochloride charged in (+), it is needless to say that the array sequence of said ion exchange membrane and the polarity of an electrode plate must be changed conversely.

[0100] In this invention, various modifications are possible to the unification with the outer case object (a) of said component (13, 14, 15). For example, it is needless to say that the anion exchange film (15) is changed to the method fixed to a supporter (a3) with said press ring (a31) and lock-pin (a32), and welding may be adhered or carried out and you may be directly fixed to a supporter (a). Moreover, cation exchange membrane (13) is changed to a supporter (a1) at the method which carries out fixing unification, is laid on a supporter (a1), has two incomes with a container liner object (b), and may be fixed.

[0101] The press section for cation-exchange-membrane (13) which has two incomes with the supporter for cation-exchange-membrane (13) (a1) of the (i). aforementioned outer case object (a), and, on the other hand, supports immobilization of cation exchange membrane (13) so that the container liner object (b) of the shape of said cylinder may be illustrated (b1), (ii) The hold section for conductive medium (12) for holding . conductivity medium (12) (b2), The supporter for electrode plate (11) which supports . electrode plate (11) (b3), (iii) (iv) It has the support for lead-wire (31) (b5) and the (vi). top disk section (b6) which support the guidance hole for lead-wire (31) (b4) to which it shows the lead wire (31) from . power supply section (3), and (v). lead wire (31), and is constituted.

[0102] The iontophoresis polar zone (1) which consists of the outer case object (a) and container liner object (b) of a configuration of having described above The conductive medium which contains the matter with which it sank into (-) pole electrode plate (11), gauze, or a water absorbing polymer ingredient, and which oxidation reduction is easy to be carried out as shown in drawing 11 (12), Cation exchange membrane (13), ionicity drugs (As-Na+) (14), and the anion exchange film (15) can be certainly held or held in the interior. Moreover, in the configuration of said outer case object (a) and container liner object (b), when both are screwed, by carrying out the variation rate of the container liner object (b) relatively to an outer case object (a), the anion exchange film (15) can be stuck to the skin (4), and the iontophoresis effectiveness can be raised.

[0103] next, this invention shown in drawing 11 -- the configuration of the grand polar zone (2) of iontophoresis equipment [like] (X) is explained the first operative condition. As shown in drawing 11 , this invention the first operative condition the grand polar zone [like] (2) of iontophoresis equipment (X) The element shown by the reference mark (21-23) which it roughly classified, and two elements of cylinder-like object [container liner] (p) ** were consisted of by the cylinder-like outer case object (o) and (ii). non-conductive (i). non-conductive, and was

described above under these elements (o, p) is held or held.
[0104] He can understand easily the configuration of the outer case object (o) of the grand polar zone (2) shown in drawing 11 , and a container liner object (p) from the configuration of said iontophoresis polar zone (1). That is, the cation exchange membrane (13) and ionicity drugs (14) by the side of said iontophoresis polar zone (1) are not used for a grand polar-zone (2) side, and if this point is taken into consideration, you can understand the configuration of the grand polar zone (2) easily from the configuration of the outer case object (a) of the iontophoresis polar zone (1) shown in said drawing 11 , and a container liner object (b). For this reason, explanation of the concrete configuration of the outer case object (o) of the grand polar zone (2) and a container liner object (p) is omitted. In addition, in this invention, in order to raise operability and convenience, the outer case object (o) of said grand polar zone (2) is what unified cation exchange membrane (23) beforehand, and may be constituted.
[0105] In drawing 11 , the container liner object (p) of the grand polar zone (2) is the point which is what laid the lead wire (32) from a power supply section (3) underground in one, and is constituted, and is different from the configuration of the container liner object (b) of said iontophoresis polar zone (1). In addition, although it is needless to say, the container liner object (p) of the grand polar zone (2) is constituted like the configuration of the container liner object (b) of the iontophoresis polar zone (1), and may hold or hold similarly operability, lead wire (32), and an electrode plate (21).
[0106] In drawing 11 , the element (5) arranged in the front section of the anion exchange film (15) of the iontophoresis polar zone (1) and the cation exchange membrane (23) of the grand polar zone (2) shows the medium which sank in conductive liquids, such as a physiological saline for improving conductivity between ion exchange membrane (15 23) and the skin (4), for example, gauze etc. In this invention, it is needless to say that said element (5) may be omitted. In this case, since the skin (4) contacts the anion exchange film (15) directly, it is needless to say that the transference number (transference number of the electrification ion of ionicity drugs) of ion improves.
[0107] In the iontophoresis equipment (X) of the first embodiment of this invention shown in drawing 11 Although not illustrated for illustration clarification, the iontophoresis polar zone (1) and/or the grand polar zone (2) are received. It is needless to say that the hold section of the adsorbent for adsorbing the supply way for a conductive medium (12 22) or ionicity drugs (14) or exhaust passage, the gas drainage hole of the gas which occurs from each electrode plate (11 12), or said gas etc. may be arranged.
[0108] Drawing 12 is drawing explaining the second embodiment of the iontophoresis equipment (X) of this invention, and is drawing corresponding to said drawing 11 . Iontophoresis equipment [like] (X) can be called modification of the thing of an embodiment the second operative condition for a start [of this invention] which is shown in said drawing 11 .
[0109] The second operative condition, for a start [which is shown in said drawing 11] which is shown in drawing 12 of this invention, as compared with the thing of an embodiment, the next configuration is only different and other configurations of iontophoresis equipment [like] (X) are substantially the same.
(i) The container liner object (b) of the iontophoresis polar zone [like] (1) was classified into two the first operative condition, and . iontophoresis polar zone (1) was constituted in what consists of a container liner object (b) and a middle cylinder (c). The concrete configuration of the component (a, b, c) which can be set like the second operative condition is clear from drawing 12 .
(ii) A configuration called the outer case object (o) and container liner object (p) of the grand polar zone [like] (2) in . grand polar zone (2) was stopped the first operative condition, and it collected into the component (q) of the box type which consists of a member (o) with the function of a free wheel plate, and a member (p) with the function of a box body. The concrete configuration of the component (q) which can be set like the second operative condition is clear from drawing 12 .
[0110] In this invention, said box type of component (q) is constituted by unifying the member (o) which has the function of the free wheel plate which unified cation exchange membrane (23)

beforehand, and the member (p) of a box body. In addition, in this invention, the flat-surface configuration of said component (q) may be the thing of requests, such as a rectangle and a round shape.

[0111] In this invention, it is needless to say that it may replace with the configuration which is shown in drawing 12 and which holds cation exchange membrane (13) with an outer case object (a) as a modification [like] the second operative condition, and you may make it the configuration held by the middle cylinder (c). In this case, what is necessary is to use what removed the supporter for cation conversion film (13) (a1) of an outer case object (a), for example, arranged the lobe inside that lower part as a middle cylinder (c), and just to hold cation exchange membrane (13) by the lobe of said middle cylinder (c).

[0112] Drawing 13 is drawing explaining the third embodiment of the iontophoresis equipment (X) of this invention, and is drawing corresponding to said drawing 12 . However, the grand polar zone (2) is omitted. this invention -- iontophoresis equipment [like] (X) is shown in said drawing 12 the third operative condition -- it can be called the modification of a thing [like] the second operative condition.

[0113] it is shown in drawing 13 of this invention -- iontophoresis equipment [like] (X) is shown in said drawing 12 the third operative condition -- the second operative condition, as compared with a thing [like], the next configuration is only different and other configurations are substantially the same.

(i) The gestalt of . conductivity medium (12) and ionicity drugs (14) enabled it to hold a solution type thing with a component (a, b, c) to using what sank into the desired medium in other firsts - the second embodiment.

(ii) In the lobe formed in the lower part of . middle cylinder (c), unification maintenance of the cation exchange membrane (13) was carried out.

[0114] Drawing 14 is drawing explaining the fourth embodiment of the iontophoresis equipment (X) of this invention, and is drawing of longitudinal section. As shown in drawing 14 , the iontophoresis equipment (X) of the fourth embodiment of this invention is roughly classified, and is constituted from three elements of the grand polar zone (2) constituted in one, and . (iii) constant voltage and (i). cylinder-like iontophoresis polar-zone (1) (ii). power-source for constant current (3) ** by the periphery section of the iontophoresis polar zone (1) of the shape of said cylinder.

[0115] While said iontophoresis polar zone (1) and land polar zone (2) are the thing of another object and this kind of iontophoresis equipment is constituted, in order that a user may take touch-down (ground), it is forced the action of grasping the grand polar zone (2) by hand during administration of ionicity drugs. However, the fourth operative condition, since the element of the iontophoresis polar zone (1) and the grand polar zone (2) is unifying as described above, iontophoresis equipment [like] (X) is excellent in operability and convenience. Moreover, since both elements (1 2) are unified, the dose of ionicity drugs, the depth of administration, etc. can be adjusted by setting spacing of both elements (1 2) as a request, or unifying two or more sets of both elements.

[0116] in this invention, the big reason which can unify both elements (1 2) is because the living body safety of the grand polar zone (2) is markedly alike and superior to before. for this reason, in the iontophoresis equipment (X) of this invention, even if the grand polar zone (2) united with an iontophoresis polar zone (1) be the case where it be contact by the part of the skin which be easy to receive ****, inflammation, a stimulus, etc. from the skin of a hand, no problem have it, and it can carry out ion administration of the ionicity drugs at insurance and an effectiveness target.

[0117] As described above, in iontophoresis equipment [like] (X), the grand polar zone (2) is a thing of this invention which is united with the iontophoresis polar zone (1) and is constituted as shown in drawing 14 (in one) the fourth operative condition. It is described above " unified and the semantics of being constituted (in one)" is united with a part of configuration member of the iontophoresis polar zone (1) like illustration. In addition, in this invention, it should not be limited to the thing of the mode indicated to be said unification to drawing 14 , but the mode of unification should be interpreted by the maximum wide sense.

[0118] The fourth operative condition, as shown in drawing 14 , it classifies into the expedient top of explanation, and each element hereafter, and the element of the iontophoresis polar zone (1) and the grand polar zone (2) is explained in iontophoresis equipment [like] (X), although it is the thing of this invention unified and constituted.
[0119] In the iontophoresis equipment (X) of the fourth embodiment of this invention the iontophoresis polar zone (1) As shown in drawing 14 , it roughly classifies. By (i). non-conductive A cylinder-like outer case object (a), And it is constituted from the element of cylinder-like object [container liner] (b) ** by (ii). non-conductive, and the element shown by the reference mark (11-15) described above on the basis of these elements (a, b) is held or held. In addition, in the periphery edge of said insulating cylinder object (a), it is combined in one and the grand polar zone (2) is constituted so that both elements (1 2) may become abbreviation flush to a skin (4) side.
[0120] As shown in drawing 5 , the top view of the iontophoresis polar zone (1) shown in said drawing 14 is circular. And since said iontophoresis polar zone (1) is grasped by the hand and contacted by the request affected part, it is constituted by the thing of desired magnitude (an outer diameter, height). Moreover, as shown in drawing 14 , said outer case object (a) and container liner object (b) are the thing of the screwing type unified by screwing through the screw section formed in both contact side. However, in this invention, the joint formats of said outer case object (a) and container liner object (b) may be other methods, for example, may be things an engagement type, a stop type, and fit-in type etc.
[0121] In the outer case object (a) of the shape of said cylinder, the part which constitutes the iontophoresis polar zone (1) The supporter for cation-exchange-membrane (13) for having two incomes with the (i). aforementioned container liner object (b), and fixing cation exchange membrane (13) so that it may be illustrated (a1), (ii) The hold section for ionicity drugs (14) for holding . ionicity drugs (14) (a2), The supporter for anion exchange film (15) for fixing . anion exchange film (15) (a3), (iii) (iv) It has a lock-pin (a32) for fixing the press ring for anion exchange film (15) (a31) for fixing . anion exchange film (15), and (v). anion exchange film (15), and is constituted.
[0122] The iontophoresis polar zone (1) and the grand polar zone (2) of the configuration of a part are completely the same as that of the thing of an embodiment on said outer case object (a) for a start which is shown by drawing 11 of non-one apparatus. And in the part of said outer case object (a), the component (13, 14, 15) is being beforehand fixed to the outer case object (a) in one like said first embodiment.
[0123] The press section for cation-exchange-membrane (13) which has two incomes with the supporter for cation-exchange-membrane (13) (a1) of the (i). aforementioned outer case object (a), and, on the other hand, supports immobilization of cation exchange membrane (13) so that the container liner object (b) of the shape of said cylinder may be illustrated (b1), (ii) The hold section for conductive medium (12) for holding . conductivity medium (12) (b2), The supporter for electrode plate (11) which supports . electrode plate (11) (b3), (iii) (iv) It has the support for lead-wire (31) (b5) and the (vi). top disk section (b6) which support the guidance hole for lead-wire (31) (b4) to which it shows the lead wire (31) from . power supply section (3), and (v). lead wire (31), and is constituted.
[0124] The iontophoresis polar zone (1) and the grand polar zone (2) of the configuration of the part of said container liner object (b) are completely the same as that of the thing of an embodiment for a start which is shown by drawing 11 of non-one apparatus.
[0125] In the iontophoresis polar zone (1) which consists of the cylinder object (a) and container liner object (b) of a configuration of being shown in said drawing 14 (-) The conductive medium containing the matter with which it sank into a pole electrode plate (11), gauze, or a water absorbing polymer ingredient and which oxidation reduction is easy to be carried out (12), Cation exchange membrane (13), ionicity drugs (As-Na+) (14), and the anion exchange film (15) can be certainly held or held in the interior. Moreover, in the configuration of said outer case object (a) and container liner object (b), when both are screwed, by carrying out the variation rate of the container liner object (b) relatively to an outer case object (a), the anion conversion film (15) can be stuck to the skin (4), and the iontophoresis effectiveness can be raised.

[0126] Next, the configuration of the grand polar zone (2) which is combined with said iontophoresis polar zone (1) of iontophoresis equipment [like] (X) in one, and is constituted the fourth operative condition shown in drawing 14 is explained. What is necessary is for shaping just to really by non-conductive plastics material perform unification of said both elements (1 2) in this invention.
[0127] As shown in drawing 14 , in the outer case object (a) of the shape of said cylinder, the part which constitutes the grand polar zone (2) The electrode plate (21) and the hold section for conductive medium (22) (a4) for roughly classifying and holding the electrode plate (21) and the conductive medium (22) by the side of the (i). grand polar zone (2), (ii) The supporter for cation-exchange-membrane (23) for fixing the cation exchange membrane (23) by the side of . grand polar zone (2) (a5), The press ring for cation-exchange-membrane (23) for fixing the cation exchange membrane (23) by the side of . grand polar zone (2) (a51, a52), (iii) And it has a lock-pin (a53) for fixing the cation exchange membrane (23) by the side of the (iv). grand polar zone (2), and is constituted, and the element shown by the reference mark (21-23) described above under these configurations is held or held.
[0128] In drawing 14 , the grand polar zone (2) is that which laid the lead wire (32) from a power supply section (3) under one, and is constituted. However, you may make it the arrangement mode of lead wire (32) support lead wire with support (b5) like the container liner object (b) of said iontophoresis polar zone (1) in the grand polar zone (2).
[0129] In drawing 14 , the element (5) arranged in the front section of the anion exchange film (15) of the iontophoresis polar zone (1) and the cation exchange membrane (23) of the grand polar zone (2) shows the medium which sank in conductive liquids, such as a physiological saline for improving conductivity between these ion exchange membrane (15 23) and the skin (4), for example, gauze etc. In addition, in this invention, it is needless to say that said element (5) may be omitted. In this case, since the skin (4) contacts the anion exchange film (15), the ion transference number (transference number of the electrification ion of ionicity drugs) improves.
[0130] It sets to iontophoresis equipment [like] (X) the fourth operative condition. it is shown in drawing 14 -- Although not illustrated for illustration clarification, the iontophoresis polar zone (1) and/or the grand polar zone (2) are received. It is needless to say that the hold section of the adsorbent for adsorbing the supply way of a conductive medium (12 22) or ionicity drugs (14), the gas drainage hole of the gas which occurs from each electrode plate (11 12), or said gas etc. may be arranged.
[0131] Drawing 15 is drawing explaining the fifth embodiment of the iontophoresis equipment (X) of this invention, and is drawing corresponding to said drawing 14 . this invention -- iontophoresis equipment [like] (X) is shown in said drawing 14 the fifth operative condition -- it can be called the modification of a thing [like] the fourth operative condition.
[0132] it is shown in drawing 15 of this invention -- iontophoresis equipment [like] (X) is shown in said drawing 14 the fifth operative condition -- the fourth operative condition, as compared with a thing [like], the next configuration is only different and other configurations are substantially the same.
(i) The container liner object (b) of the iontophoresis polar zone [like] (1) was classified into two the fourth operative condition, and . iontophoresis polar zone (1) was constituted in what consists of a container liner object (b) and a middle cylinder (c). The concrete configuration of the component (a, b, c) which can be set like the fifth operative condition is clear from drawing 15 . In the zone (m, n) shown with the circular broken line shown in drawing 15 , the (m) zone is a zone which prescribes ionicity drugs for the patient, and the (n) zone is a zone which leads the current which flows in the skin to the grand (ground) polar zone. In addition, (mn) shows the insulating section (shielding section) of a negative electrode (11) and a positive electrode (21) among drawing.
[0133] In this invention, it is needless to say that it may replace with the configuration which is shown in said drawing 15 and which holds cation exchange membrane (13) with an outer case object (a) as a modification [like] the fifth operative condition, and you may make it the configuration held by the middle cylinder (c). In this case, what is necessary is to use what removed the supporter for cation-exchange-membrane (13) (a1) of an outer case object (a), for

example, arranged the lobe inside lower as a middle cylinder (c), and just to hold cation exchange membrane (13) by the lobe of said middle cylinder (c).
[0134] Drawing 16 is drawing explaining the sixth embodiment of the iontophoresis equipment (X) of this invention, and is drawing corresponding to said drawing 11 . However, the iontophoresis polar zone (1) is omitted. Iontophoresis equipment [like] (X) can be called modification of an embodiment the sixth operative condition for a start [of this invention] which is shown in said drawing 11 .
[0135] The sixth operative condition, for a start [which is shown in said drawing 11] which is shown in drawing 16 of this invention, as compared with the thing of an embodiment, the next configuration only equips iontophoresis equipment [like] (X), and other configurations are substantially the same.
(i) A configuration called an outer case object [like] (o) and a container liner object (p) in the configuration of . grand polar zone (2) was stopped the first operative condition, and it considered as the member (o) which has the function of a free wheel plate for these elements (o, p) like the second embodiment shown in drawing 12 , and the member (p) with the function of a box body, and these were unified and it considered as the box type component (q).
(ii) . In said component (q), it constituted so that a conductive medium (24) could be made for the configuration of the member (o) corresponding to an outer case object [like] (o) to intervene the first operative condition and cation exchange membrane (23) and the anion exchange film (25) might be held. That is, the cation conversion film (23) and the anion exchange film (25) were beforehand fixed in one to the member (o), and the convenience and operability were raised.
(iii) It constituted from a physiological saline which contains the matter which is easy to carry out oxidation reduction as a . conductivity medium (22 24).
(iv) . -- the component (5) arranged in the front section of the anion exchange film (15) of the iontophoresis polar zone (1) which can be set like the first operative condition, and the cation exchange membrane (23) of the grand polar zone (2) was removed.
[0136] Drawing 17 is drawing explaining the seventh embodiment of the iontophoresis equipment (X) of this invention, and is drawing corresponding to said drawing 14 . However, the iontophoresis polar zone (1) is omitted. In addition, drawing 17 is the important section enlarged drawing of the grand polar zone (2).
[0137] it is shown in drawing 17 of this invention -- iontophoresis equipment [like] (X) is shown in said drawing 14 the seventh operative condition -- the fourth operative condition, as compared with a thing [like], the next configuration is only different and other configurations are substantially the same.
(i) -- the component (21, 22, 23) shown in drawing 14 in the configuration of the electrode plate (21) of . grand polar zone (2), and the hold section for conductive medium (22) (a4) -- in addition, it constituted so that a conductive medium (24) and the anion exchange film (25) could be held further. In the interior of said hold section (a4), said conductive medium (24) and the anion exchange film (25) were constituted so that it might hold or hold by the member (a6, a7) illustrated. And said cation exchange membrane (23) and the anion exchange film (25) used what was beforehand fixed to the member (a6, a7), and made it the structure attached in the hold section (a4). What is necessary is to supply and just to discharge the conductive medium (24) of a between [both ion exchange membrane (23 25)], and the conductive medium (22) of the perimeter of an electrode plate (21) in this invention, by the feed hopper and exhaust port which are not illustrated.
(ii) . The component (5) arranged in the front section of the anion exchange film (15) (not shown) of the iontophoresis polar zone (1) and the cation exchange membrane (23) of the grand polar zone (2) was removed.
[0138] the seventh operative condition shown in drawing 17 -- iontophoresis equipment [like] (X) -- the iontophoresis polar zone (1) and the grand polar zone (2) -- respectively -- alike -- cation exchange membrane and the anion exchange film -- every two-sheet ion exchange membrane of a total of four sheets -- arranging -- said -- although it is the same as a thing [like] the sixth operative condition -- other operative conditions -- it differs from a thing

[like] (a total of three-sheet use). And iontophoresis equipment [like] (X) does so the effectiveness which was excellent as it proved in the iontophoresis experiment with this experimental device shown in drawing 8 the seventh operative condition. In addition, it is a thing needless to say that it is desirable to be arranged so that it may become flat-tapped with the anion exchange film (15) of the iontophoresis polar zone (1) which does not illustrate [in / the seventh operative condition / iontophoresis equipment / like / (X)] the cation exchange membrane (23) of the grand polar zone (2) as which it is indicated in drawing 17 .

[0139]

[Effect of the Invention] The iontophoresis equipment which has the property which was excellent in the following by this invention is offered.

(i) Since . iontophoresis polar zone (operation lateral electrode section) and the grand polar zone (non-acting example polar zone) can maintain the energization condition (constant current and/or constant voltage) stabilized over a long period of time, the drugs component charged in forward (+) of ionicity drugs or negative (-) in the iontophoresis polar zone can be efficiently conveyed to the skin (or membrane) (drug delivery).

(ii) While contributing to maintenance of the stable energization condition which . iontophoresis polar zone (operation lateral electrode section) and the grand polar zone (non-acting example polar zone) described above, the bad influences (a skin stimulus, ****, inflammation, etc.) to the skin by electrode reaction can also be eliminated by the use mode (arrangement mode) of specific ion exchange membrane.

(iii) The iontophoresis equipment of . this invention The ion exchange membrane which is two or more sheets from which ion selectivity differs to the iontophoresis polar zone (operation lateral electrode section) and the grand polar zone (non-acting lateral electrode section) is applied. And although the arrangement mode of these ion exchange membrane is used changing with the electrification property (a cation or anion) of ionicity drugs Since he is trying to arrange the arrangement object of ion exchange membrane according to the electrification property of the ionicity drugs beforehand manufactured to each polar zone, enabling free attachment and detachment, handling nature (convenience) can improve and ionicity drugs can be efficiently prescribed for the patient. Moreover, the arrangement mode of the ion exchange membrane when constituting each polar zone cannot be mistaken, incorrect actuation can be avoided, and insurance and an effectiveness target can be medicated with ionicity drugs.

(iv) When . iontophoresis polar zone (operation lateral electrode section) and the grand polar zone (non-acting lateral electrode section) are unified, it is released from the activity which takes a gland (ground) in the healer like before, and convenience improves. Moreover, in said unification structure, when two or more sets of iontophoresis polar zone and the grand polar zone are unified, the penetrance (depth of penetration from a skin front face) into the skin of ionicity drugs can be adjusted to a request.

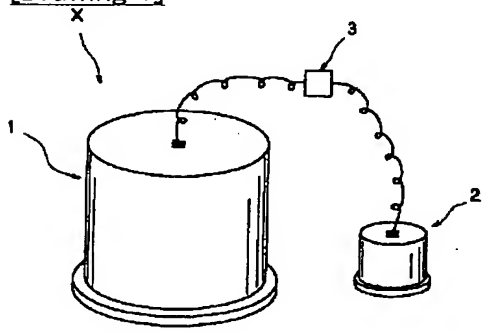
[Translation done.]

* NOTICES *

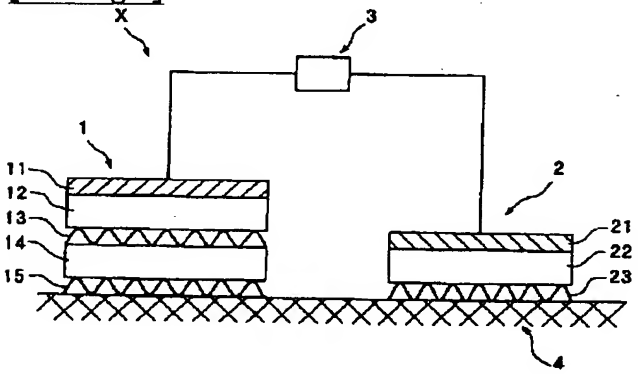
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

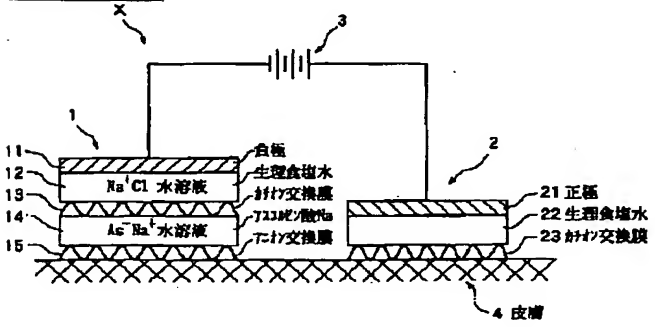
[Drawing 1]



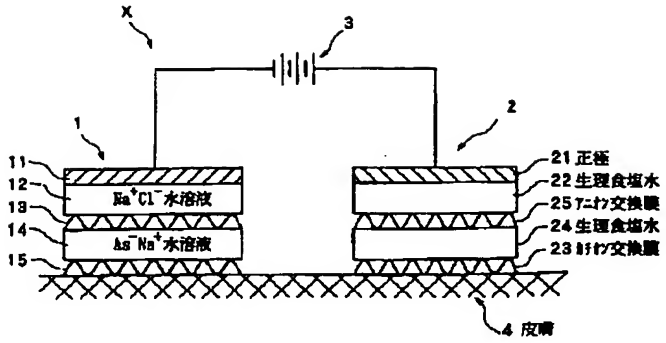
[Drawing 2]



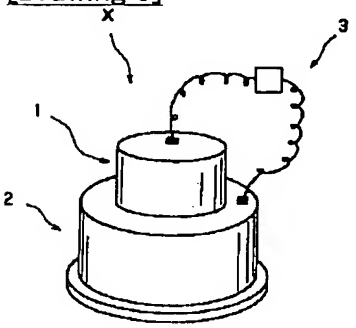
[Drawing 3]



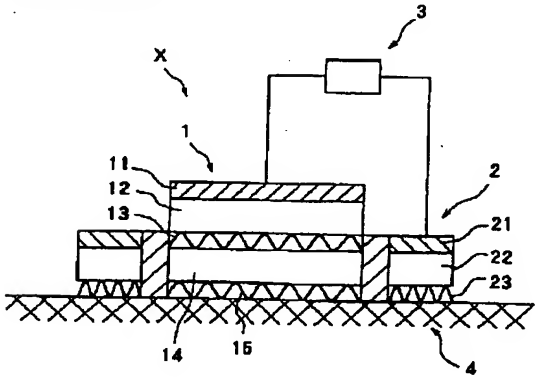
[Drawing 4]



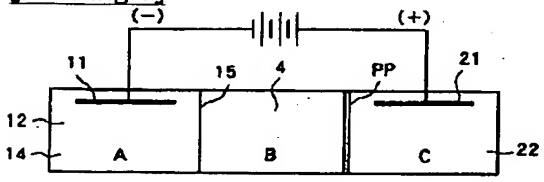
[Drawing 5]



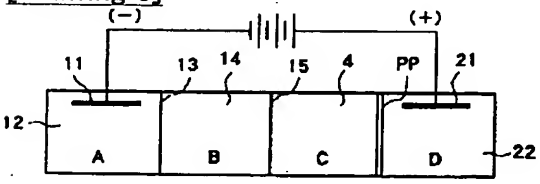
[Drawing 6]



[Drawing 7]



[Drawing 8]



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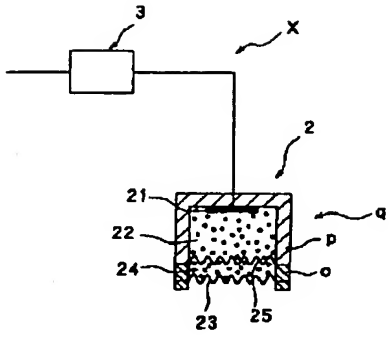

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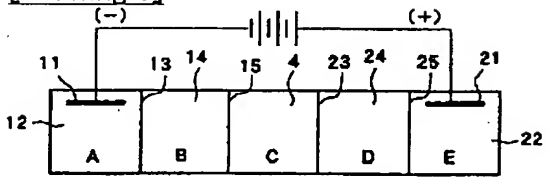
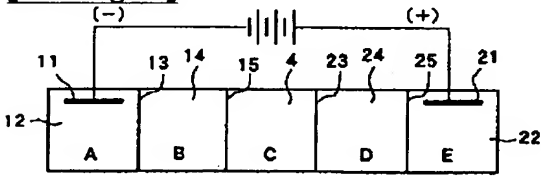
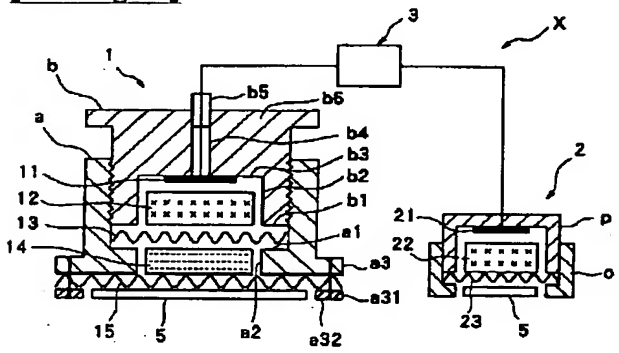


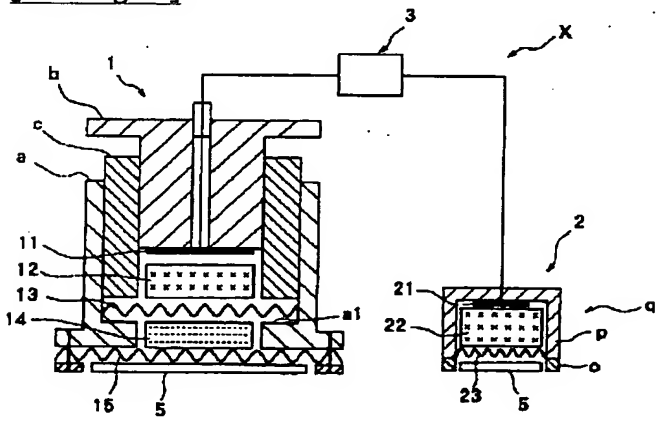
[Drawing 10]



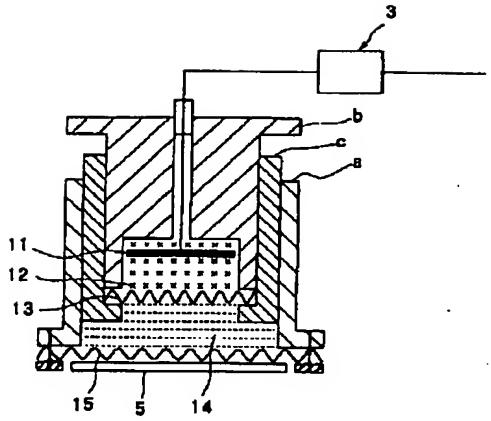
[Drawing 11]



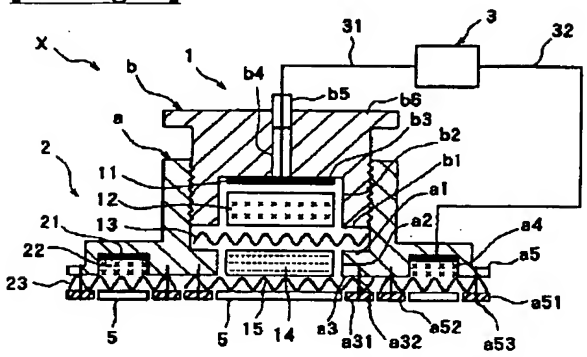
[Drawing 12]



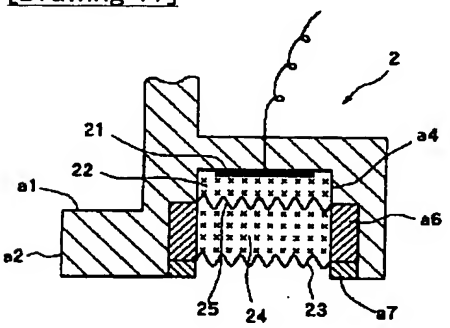
[Drawing 13]



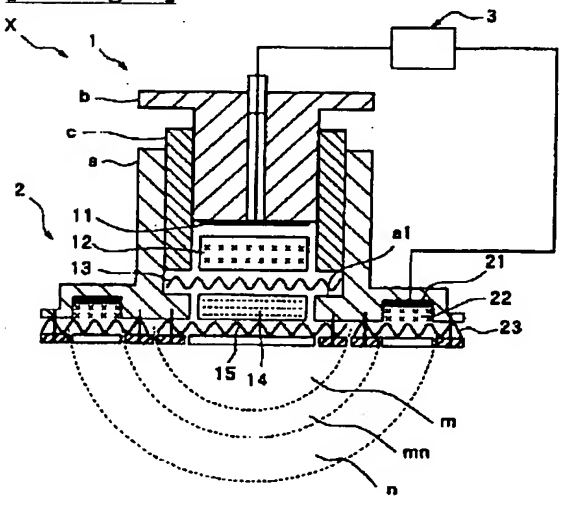
[Drawing 14]



[Drawing 17]



[Drawing 15]



[Translation done.]